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CHARLES WILLISON JOHNSON
1863-1932.

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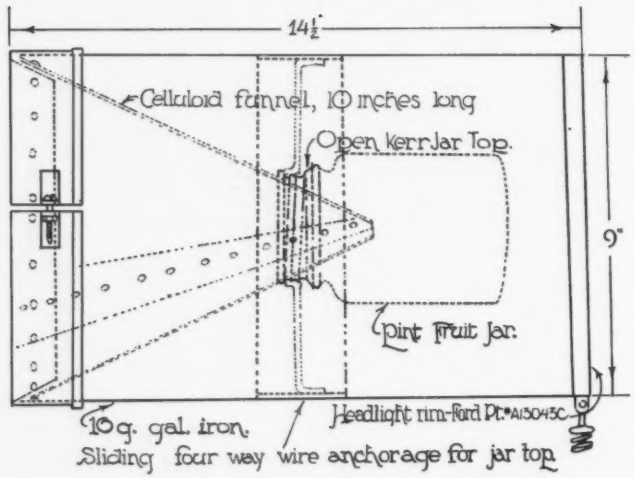

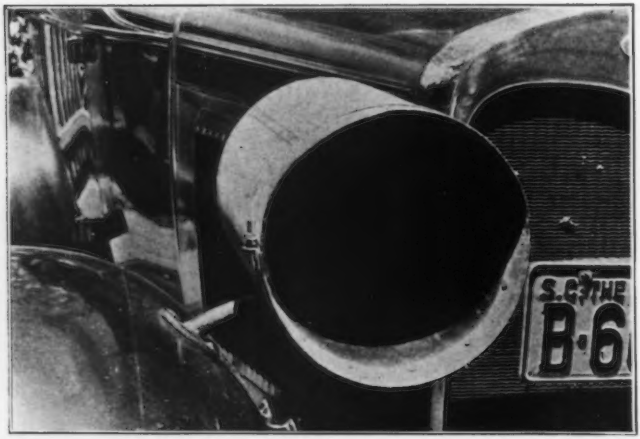

FIG. 1. A schematic drawing of an insect trap for a headlight of an automobile.
FIG. 2. An insect collecting trap on the headlight of an automobile.
Hall, Hull and Dove.

ENTOMOLOGICAL NEWS

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New Method in Sand Fly Studies (Diptera: Chironomidae).

By D. G. HALL, J. B. HULL, and W. E. DOVE, Division of Insects Affecting Man and Animals, U. S. Bureau of Entomology.

(Plate II.)

The present paper describes some methods for (1) obtaining adult sand flies, (2) the preservation of the natural shape and color of such adults, and (3) the preparation of immature stages for microscope slides. These methods are satisfactory in our studies on sand flies, and it is thought that other entomologists may find them useful in their work.

AN AUTOMOBILE-HEADLIGHT INSECT TRAP.

An inexpensive, easily transported light trap used to collect insects at night is herein described. It is adapted for use on the headlight of one of the small popular makes of automobiles.

In order to obtain information on the seasonal incidence of sand flies in different marsh areas it was necessary to devise a means of collecting these midges. It was learned that sand flies are attracted to artificial light, and that they can be trapped by the use of such light. Since the areas in which sand flies breed are often some distance from available electric lines, illumination was secured from the headlight of an automobile. by the use of such light. The trap described below is efficient in collecting sand flies and it is not cumbersome to handle.

If one takes an automobile headlight rim and a jar top rim to a tinner, he can have the metal parts of the trap assembled. When this is accomplished, it is an easy matter for one to make a cone from a sheet of heavy celluloid.

A cylinder 14 inches long is rolled from a sheet of 16 gauge galvanized iron so that its diameter is the same as that of a headlight rim of an automobile. This cylinder is soldered to the headlight rim so that the end receiving the rim can be fastened to the reflector of the automobile headlight. When in

use the trap replaces the rim and lens ordinarily used in the headlight. A second rim, 2 inches wide, is made so that the ends fasten together with a small bolt. This is made large enough to serve as a band around the front end of the cylinder. To the edge and on the inside of this band the tinner solders a 1-inch strip of sheet iron which is punched with small holes at intervals of about 3 inches. It is soldered at an angle so that a celluloid cone can be anchored to it. (Figs. 1 and 2.)

Another 2-inch rim is made so that it slides on the inside and about midway of the cylinder. It supports a jar top so that the latter may receive a pint size fruit jar. The jar top is anchored by soldering 4 wires on the outside and bending them so that the free ends can be soldered to the inside of the rim. (Figs. 1 and 2.) When the pint jar and the trap are placed in position, it is possible to slide this rim so as to provide ample clearance between the bottom of the jar and the bulb of the headlight. Also, this sliding feature permits one to vary the length of the cone of the trap.

It is not difficult to make a cone for the trap. It is best to cut a pattern from a large piece of heavy paper and use this in cutting the sheet of celluloid. If one uses a 10-inch radius and draws a circle, he can mark off a distance on the circumference of this circle which will be of the same length as the circumference of the front end of the cylinder. This distance may be obtained by actual measurement or by multiplying the diameter of the cylinder by 3.1416. The ends of such a line are connected to the point in the center of the circle. As the pattern is drawn on the paper, allowance is made for overlapping of the ends of the celluloid so that the cone can be fastened together with turn-under rivets. Such rivets are used ordinarily as paper fasteners and are provided with a split point. They serve also in anchoring the cone to the front rim of the trap.

When the trap is in operation, the companion headlight of the car is not allowed to burn. Sometimes it is also advisable to cut off or cover the tail light. Large insects may be kept from the trap by means of coarse screen wire. Effects of colored lights can be studied if gelatin filters of such colors are mounted between clear glass lenses and placed in position in the rear rim of the trap.

A Preservative for Adult Sand Flies.

When specimens of *Culicoides, Leptoconops* and other biting midges are killed and kept in a dry pill box, or placed immediately on card points, they do not retain the normal shape. When they are preserved in alcohol, they do not retain the pollinosity and color pattern. The following formula was found to satisfy our requirements in preserving these small Diptera:

Alcohol, ethyl, 95 per cent	85 cc.
Formalin, 10 per cent	15 cc.
Glycerine	5 cc.

Living or newly killed specimens are placed in the solution and are allowed to remain in it as long as one desires. This period should not be less than 24 hours. The solution serves as a preserving fluid or as a treatment for specimens preparatory to mounting them on tips. When pinned specimens are desired, it is necessary to dehydrate them slowly and completely. They are placed successively in 85 per cent, 95 per cent, and absolute ethyl alcohols, and xylol, allowing a full ten-minute period in each change. Instead of transferring the specimens with forceps or a camel's-hair brush, we find it satisfactory to use a small tip pipette in draining off the solutions. In this way the changes of solutions are made in one vial. During the process of clearing in xylol the specimens are given a normal position on folded strips of filter paper, so that the wings are in contact with the paper. The specimens and paper are gently removed from the solution and allowed to dry. The specimens are then mounted on tips in the usual manner.

Hetherington's Solution.

For detailed studies of chitinous structures in entomological work, cleared specimens are usually necessary. A solution reported by Hetherington [1] for nematodes was found effective in fixing, clearing, and dehydrating dipterous larvae and non-pigmented insects.

The solution consists of:

Absolute alcohol	20 cc.
Chloroform	15 cc.
Acetic Acid (Glacial)	5 cc.
Phenol Crystals	10 cc.

Since this is a fixing as well as a clearing agent, it is not necessary to kill or fix specimens in any other way. The freshly collected or living specimens are simply dropped into the solution. Mature muscoid larvae fix and clear satisfactorily in freshly prepared solutions in about 24 hours, while newly hatched larvae will clear in about one-half that time. When specimens appear clear enough they are transferred to a mixture consisting of equal parts of this solution and oil of wintergreen. After about 15 minutes they are transferred to pure oil of wintergreen. When the specimens are sufficiently infiltrated, which usually requires over-night treatment, they are mounted in neutral balsam containing a few drops of oil of wintergreen.

Internal chitinous structures such as the buccopharyngeal apparatus of dipterous larvae or the internal genitalia of non-pigmented insects clear nicely in this solution. Owing to instant fixation, the specimens usually die in normal positions. Since fixing, clearing, and dehydration are accomplished in one solution, much time is saved.

The solution has some disadvantages. Fifteen days after it is prepared it loses its clearing power. It is, therefore, necessary to make up small quantities, and use only fresh material. Since it does not remove color it is not usable on pigmented chitin. The use of oil of wintergreen causes the specimen to assume a slightly yellowish tinge. This color is not objectionable in the study of the material. The specimens are comparable to those mounted in balsam for a few years.

Summary.

1. A trap for collecting insects is described for use on the headlight of an automobile.

2. A preserving fluid is reported which gives natural shape and color in specimens of sand flies.

3. Hetherington's solution for nematodes is reported as useful in fixing and clearing dipterous larvae and non-pigmented insects for microscope slides.

[1] Jour. Parasit. 9: No. 1, Sept., 1922.

Observations on the Beetle Mordellistena nigricans (Coleop.: Mordellidae).

By Anna May French.

This paper is a record of observations made on the stem-boring beetle, *Mordellistena nigricans* Melsheimer. This beetle is an inhabitant of the pith cavity of *Desmodium dillenii,* which grows on dry exposures on the wooded hills about Ithaca, New York. The stems are erect and woody, growing to a heighth of about three feet, and tapering from base to tip. However, the pith cavity remains practically the same size throughout. This cavity is just the right size to comfortably accommodate the full grown larvae. The pith is soft, moist, and decidedly spongy.

The larvae were found in the fall of 1929. At that time of year *Desmodium* stalks of two sorts are present: those that were produced the preceding summer and those of a year's standing. The larvae were not found in any case in the old stems. In the shoots of the season, the percentage of infestation is very high, two-thirds of the stems containing the larvae. Only one beetle larva was found in any of the stems examined.

Other Inhabitants of the Stems.

On the Desmodium stems were found galls made by the larvae of a *Lasioptera.* The galls were compound, the number of larvae found in any one gall varying from two or three to eight. The adults of these Diptera first emerged two weeks preceding the adult beetles. Mating was observed soon after the emergence of the adults. The adults lived but a short time. Mordellid beetles have been said to feed upon various dipterous larvae inhabiting stems or old wood. However it does not seem likely that these larvae are fed upon by the beetle, since the galls do not connect with the pith cavity, nor were the beetle larvae found in their vicinity.

A parasitic hymenopteron was found in the stems in two instances. The adults of these emerged at the same time that the adult beetles emerged from the other stems.

The Larva.

The larvae found in the fall varied slightly in size, being from five to six millimeters long. There was no increase in

size noted during the winter. The body is cylindrical in form; when in the stem, the posterior part of the abdomen is slightly arched. It is of a light cream color with the exception of the dark brown mandibles. The whole body is very lightly chitinized—the chitin being somewhat heavier at the ends. The caudal portions of the abdomen and the head and thorax are quite hairy. The skin of the larvae was so thin that care had to be taken to keep from puncturing it. A moistened camel's hair brush was used for transferring specimens.

The larvae have no eyes and only small vestiges of antennae. The three-jointed thoracic legs are short and fleshy, and there are no tarsal claws. There are no ventral prolegs on the abdomen. However on the first six segments on the dorsal side are six proleg-like tubercles, a specialization which admirably fits the larvae for their stem dwelling habits and forms the most distinctive external character. On the caudal end of the abdomen is an anal sucker which also aids in locomotion.

Larval Habits.

The pith cavity of the desmodium is just the right size to comfortably accommodate the larva but there is no chance for it to turn around. The larvae face toward the top of the stem in all cases. Their position in the stem however, varies. When the stems were brought in the larvae were found uniformly near the base of the stem. Towards spring they were found closer and closer to the top. In the stem the larvae move rapidly and backwards and forwards with equal facility. This can readily be observed in a partly opened stem. In order to observe this process more clearly, a larva was placed in a glass tube having about the same bore as the pith cavity of the desmodium. The movement could then be observed in detail. While the body is held in place by the legs, it contracts, moving the anal disk forward. The anal disk is attached, the legs release their hold, the body lengthens and the prolegs distend in a wave which proceeds from the last one to the first. Thus the body is very firmly anchored while being pushed forward.

Frass is sometimes found gathered together in some cranny in the pith, and sometimes it is scattered. In either case it is not abundant.

The Pupa.

The pupa when first found was of a creamy white color, except for the black eyes. By the following day, however, the tibia and tarsi of all the legs, the antennae, the genitalia, the mouthparts, and the wing-pads were dark brown or black. The remainder was tan rather than cream colored. By the third day the whole pupa was dark.

The head was bent under the prothorax. It was covered with numerous fine hairs, appearing almost fuzzy when seen with a lens. The eyes were large and very black and shiny. The serrate, eleven segmented antennae lay along the wing pads, close to the prothorax. The wing pads were dark brown, covered with fine hairs and showed the longitudinal tracheae quite plainly. On the dorsal side of each of the first four of the seven visible abdominal segments was a pair of flattened appendages, each bearing a row of recurved spines on its outer edge. Doubtless these serve the purpose of anchoring the pupal skin when the adult emerges. They correspond in position to the dorsal "prolegs" of the larva.

A glass tube having the diameter of the larval burrow was used in observing the transformation of the pupae to the adults. The beetles could be clearly seen and at the same time excess handling was avoided.

The pupa has no means of locomotion, but it twitches from side to side, moving the tarsi and mouthparts inside of the pupal skin.

The life history was observed only from the time of the finding of the larvae in November to the emergence of the adults in late April and early May. When found the larvae were apparently full grown. The entire winter is spent in the larval state. Attempts to force the development by keeping the larvae at room temperature failed. Only those which were left out of doors all winter developed. Stems were opened at regular intervals in order to determine the time of pupation. The first pupa was found on April twenty-third, and the last one on May eighth. The adult emerges in from three to four days. The first one appeared on April twenty-sixth.

The Nesting Habits of Paranysson, an African Genus of Fossorial Wasps (Hymenoptera, Sphegoidea).

By J. BEQUAERT, Department of Tropical Medicine, Harvard Medical School, Boston, Mass.

Some twenty years ago, in February, 1912, I spent a week at Kasenga, in the Katanga District of the southeastern Belgian Congo (in lat. 10° 15′ S. and long. 28° 45′ E.), waiting for an opportunity to continue my journey. One day I noticed a flourishing colony of *Paranysson melanopyrus* (Smith) [1] busily at work in the open central yard of the station. At that time, the habits of *Paranysson* were unknown and I am not aware that they have been studied to any extent since. G. Arnold (1923, Ann. Transvaal Mus., X, 1, p. 13) writes of this genus, apparently from personal observation: "These insects dig short and oblique tunnels in sandy soil. I have never found them with prey, the nature of which is still unknown. *P. quadridentatus* Cam. has a most powerful odor of bugs."

In the colony which I observed, each nest consisted of a nearly straight, vertical shaft, 6 to 8 mm. wide, sunk in the bare sand to a depth of about 75 cm. (2½ ft.). The lower end of the shaft branched into a few short, more or less horizontal galleries or cells, placed at about the same level in various directions. Each cell measured 10 to 12 mm. in length and 4 to 5 mm. in diameter. The entrance to the burrow was hidden by the loose sand thrown out from the shaft and forming an elliptical mound, about 12 cm. long, 9 cm. wide and 3 cm. high. Through the larger axis of this mound ran a curved tunnel, slightly wider than the shaft into which it led, while it opened on the narrow side of the mound. The sand was more closely packed together and apparently cemented, either by moisture or by saliva, about the tunnel. Often a female wasp was seen resting in the tunnel, with her face in the doorway.

One of the nests dug up comprised three cells, one of which was open and empty, while the other two were closed and contained each a nearly full-grown wasp larva, dirty white in color with a slight bluish tinge. In other nests I found cells with

[1] Identified by Dr. G. Arnold, of the Rhodesia Museum, Bulawayo.

prey and young wasp larvae. In all cases the prey consisted of larvae at different instars of a pentatomid bug, *Natalicola pallidus* Westwood.[2] As a rule, six or seven of these bugs were stored in each cell; they were not dead, but merely paralyzed, as shown by the slight movements of antennae and legs.

F. F. Kohl and Ant. Handlirsch regarded *Paranysson* as at most subgenerically distinct from *Nysson*. But R. E. Turner, in 1914 (Ann. Mag. Nat. Hist., (8) XIV, pp. 337-359), showed that these two groups have little in common. Turner united *Paranysson, Sericophorus, Zoyphium* and *Sphodrotes* into a subfamily Paranyssoninae. He pointed out that *Paranysson* differs from *Nysson*, among other points, in the single tibial spur of the middle tibiae and the deep excision of the outer (or lower) margin of the mandibles.

Turner's conclusions are fully supported by my observation of the habits, which shows that *Paranysson* is a true predacious wasp, digging its own nest and bringing in its own prey for the offspring. *Nysson*, on the other hand, is from all accounts an inquiline or cleptobiont in the nests of other fossorial wasps of the subfamily Gorytinae. G. Arnold (1929, Ann. Transvaal Mus., XIII, 4, p. 218) writes of *Nysson* that "by some authors they have been regarded as parasitic in their habits, but there is no evidence to support such a view." I believe, however, that the following observations, on two European and two North American species, leave little doubt as to the inquiline habits of the true Nyssoninae, which were suspected many years ago by Shuckard, Taschenberg and others.

C. Ferton (1901, Ann. Soc. Ent. France, LXX, pp. 107-108; 1923, La Vie des Abeilles et des Guêpes, pp. 152-153[3]) saw the female of *Nysson dimidiatus* Jurine, at Bonifacio, Corsica, opening the burrows, dug in the soil, of *Gorytes* (*Arpactus*) *elegans* (Lepeletier). The *Nysson* would enter the burrow and, if she found the *Gorytes* cell incompletely provisioned and without the egg, would leave the nest at once, closing up the en-

[2] Identified by Dr. H. Schouteden, Director of the Congo Museum at Tervueren, Belgium.

[3] Fig. 27 of this posthumous volume of collected papers, edited by E. Rabaud and F. Picard, does not represent a *Nysson*.

trance; she would then remain in the neighborhood, watch for the *Gorytes*, and reënter the burrow some time later. Ferton, however, was unable to find either the egg or the larva of *Nysson*. G. Adlerz (1910, K. Svensk. Vet. Ak. Handl., XLV, No. 12, pp. 33-38) was more successful with *Nysson maculatus* (Fabricius), in Sweden. He not only observed this wasp entering the burrows of *Gorytes* (*Arpactus*) *tumidus* (Panzer), but in four different cells, belonging to three nests which he dug up after seeing *Nysson* entering them, he found the *Nysson* egg concealed under the folded wings of one of the leafhoppers that had been stored by the *Gorytes* female. In a fourth nest he discovered a small *Nysson* larva in the same position.[4]

G. P. Barth (1907, Bull. Wisconsin Nat. Hist. Soc., V, 3, pp. 145 and 147), in Wisconsin, observed on two occasions a female *Nysson fidelis* Cresson entering the burrow of *Gorytes canaliculatus* Packard by quickly scratching it open, then remaining for a short while, and closing the entrance again after coming out. Upon excavating these two nests, the *Nysson* egg was not found in one case; but in one of the cells of the other nest, in addition to the *Gorytes* egg placed upon one of the leafhoppers stored as prey, another egg was found unattached on the floor of the cell. This egg was similar in shape to that of the *Gorytes* egg, but smaller and less shiny. E. G. Reinhard's recent observations on *Nysson* (*Brachystegus*) *hoplisivora* Rohwer, in Maryland, are even more illuminating (1925, Jl. Washington, D. C., Ac. Sci., XV, pp. 172-177; 1929, The Witchery of Wasps, pp. 262-271). The female of this wasp enters the burrows of *Gorytes* (*Hoplisus*) *costalis* Cresson, breaking through the barricade of loose sand at the entrance, tarries a few seconds within the nest, and upon emerging, carefully rearranges the sand over the doorway. Upon opening nests visited by the *Nysson*, a cell was found on several oc-

[4] In their account of the habits of *Nysson*, A. H. Hamm and O. W. Richards (1930, Trans. Ent. Soc. London, pp. 103-104) mention a number of species found associated in various ways with species of *Gorytes* (*s. lat.*). Most of the relations they list (apart from the observations by Ferton, Adlerz and Reinhard) seem to be based on mere circumstantial evidence. These authors appear to have overlooked Barth's paper.

casions containing both the *Gorytes* egg and the *Nysson* egg attached to the prey brought in by the *Gorytes* female. In every case the *Nysson* egg was skillfully concealed under the folded wings of the tree-hopper serving as prey to the *Gorytes*. The egg of the *Nysson* is laid before that of *Gorytes* and, as it hatches first, the young *Nysson* larva feeds for a short time on the prey and then explores the cell for the egg of its host, which it devours. The *Nysson* larva may now feed without danger of molestation upon the store of provisions accumulated by the *Gorytes* female.

G. Arnold (1923, *Loc. cit.*) gives the distribution of *Paranysson* Guérin (including *Helioryctes* Smith and *Mesopalarus* Brauns; *Pseudohelioryctes* Ashmead also is a synonym) as "African, Indian and N. American regions." The few Indian species, such as *P. assimilis* (Bingham), do not appear to be generically separable from the African forms. The Nearctic species, however, which Cresson, Ashmead and others referred to *Paranysson*, are not in any way related to that genus; but, as recognized by R. E. Turner (1914, *Loc. cit.*, p. 339) and by S. A. Rohwer (1921, Proc. U. S. Nat. Mus., LIX, pp. 404-405), they are typical Nyssoninae. Rohwer considers that they form a subgenus of *Nysson*, which he calls *Zanysson* Rohwer. *Paranysson*, as well as the remaining Paranyssoninae, are therefore confined to the Old World.

Mantis Captures Hummingbird (Orthop.: Mantidae).

On September 28, while working in my garden, I heard my neighbor give a yell; on asking her what was the matter, she said "a big, green bug about a foot long, with long arms with teeth on them, had caught a hummingbird, and with this stick I knocked the bug down." We searched all along the honeysuckle covered fence but could not find the "bug," but we did find the hummingbird; which was alive, and in a few minutes flew away seeming none the worse for its experience. There is no doubt but that the insect was the Japanese mantis (*Paratenodera sinensis* Sauss.), which is quite common around Philadelphia. It would have been interesting to know how the combat would have ended had the combatants been allowed to finish the struggle. Knowing the strength and hold the female mantis has in those front legs, I believe the mantis would have won out. PHILIP LAURENT, Philadelphia.

Notes on some New Jersey Dragonflies (Odonata).

By B. Elwood Montgomery, Purdue University, Lafayette, Indiana.

While at Moorestown, New Jersey, during the summer of 1930, Esther Barrett Montgomery and I used much of our spare time to study and collect dragonflies. Eleven hundred and eighty-six specimens, representing 46 species were secured. Many of these species are common and already well known from the localities where we captured them, but a few are considered rare insects and some were taken in new localities; one species has not been reported previously from New Jersey.

I am indebted for a few specimens and for information concerning collecting grounds to several members of the staff at the Japanese Beetle Laboratory, especially to Dr. Henry Fox who took me to several localities in South Jersey where we made many interesting captures. Mr. E. B. Williamson has checked the determination of a few species.

3.* Progomphus obscurus Rambur. Along a stream in the pine barrens, near Browns Mills, June 15, 4 ♂. These specimens which measure 46, 47, 47, and 49 mm., in length, are considerably smaller than other specimens of this species which I have seen.

83. Anax longipes Hagen. Lily Lake, a small body of fresh water near the ocean, Cape May, August 10, 1 ♂.

97. Aeshna umbrosa Walker. Moorestown, August 28, 1 ♂.

148. Somatochlora tenebrosa Say. A female was found alive inside an insectary at the Japanese Beetle Laboratory, August 7.

168. Dorocordulia lepida Hagen. Taunton Lakes, July 27, 1 ♀.

171. Nannothemis bella Uhler. Browns Mills, June 15, 3 ♂ 1 ♀. Found only in a small bog, not more than ten feet in diameter, at the margin of a stream.

175. Celithemis monomelaena Williamson. Clayton, July 20, 1 ♂.

* The numbers are those of the Handbook of the Dragonflies of North America by Needham and Heywood.

177. CELITHEMIS MARTHA Williamson. Clayton, July 20, 1 ♀. Captured in a small area partly grown up with low vegetation and partly mud shore, between a lake and an open woodland. with the preceding species. Dragonflies, other than *Perithemis tenera* Say, were not common here, but one each of *Libellula incesta* Hagen, *Pachydiplax longipennis* Burmeister, and *Ischnura posita* Hagen were taken and two species of *Tramea* were seen.

219. SYMPETRUM SEMICINCTUM Say. Rancocas Park, July 29, 1 ♀. Frequent visits were made to this locality thruout the summer. The collecting grounds consisted of the weedy margin of a lake formed by a dam in Rancocas Creek bordered by wooded hills and the highlands nearby where only sparse vegetation and a few pines grew. During the day the lake margin was usually a lively dragonfly community, including such species as *P. tenera, Libellula luctuosa* Burmeister, *L. cyanea* Fabricius, *L. pulchella* Drury, *L. incesta, P. longipennis,* and *Erythemis simplicicollis* Say, but in the late afternoon when the hills cast shadows across the lake, these conspicuous species disappeared. At this time of day the highlands, where few, if any, dragonflies were found earlier, became the haunt of *P. tenera, L. luctuosa,* and *L. pulchella* and occasionally *Plathemis lydia* Drury, *Sympetrum vicinum* Hagen or Tramea. In the vegetation near the lake were found *Agrion maculatum* Beauvois, *Lestes inaequalis* Walsh, *L. rectangularis* Say, *L. vigilax* Hagen, *Emallagma geminatum* Kellicott, *E. signatum* Hagen, *E. vesperum* Calvert, *I. posita,* and *I. verticalis* Say. These seemed to become more active as the shadows fell across the lake and the larger species left them in peace.

298. NEHALENNIA GRACILIS Morse. Fisher's Dam, August 6, 1 ♀ ; Taunton Lakes, July 30, 3 ♂ 1 ♀, August 7, 5 ♂ 2 ♀.

299. NEHALENNIA INTEGRICOLLIS Calvert. Fisher's Dam, August 1, 1 ♀ ; Taunton Lakes, July 30, 3 ♂ 1 ♀.

300. NEHALENNIA IRENE Hagen. Fisher's Dam, August 1, 1 ♀ ; Taunton Lakes, July 30, 2 ♂. This and the two preceding species were taken at each locality only in bog areas; at Taunton Lakes this bog area was in deep shade and the odor of bog gas was very noticeable. The number of each species

captured may be taken as an index of the relative abundance of the species in these localities. Since my earlier collecting experience in the lake region of northern Indiana, wher the veteran Odonatologist Williamson taught me that Nehalennias are rarities, I have made special effort to hunt out the probable *Nehalennia* habitats in each locality and to collect until no more specimens can be found.

306. ENALLAGMA DIVAGANS Selys. Browns Mills, June 15, 1 ♂. Associated with *Argia violacea* Hagen, *I. posita* and *I. verticalis* on a small stream in the pine barrens.

322. ENALLAGMA VESPERUM Calvert. This species was taken frequently at Taunton Lakes, Medford Lakes, Rancocas Park and Fisher's Dam from July 18 to August 25. Many of our collecting trips into the pine barrens were made in the late afternoon—after the official hours for work—and extended until dusk, thus including the time when this species is on the wing.

328. ENALLAGMA WEEWA Byers. Fisher's Dam, August 1, 1 ♂, August 6, 80 ♂, August 18, 7 ♂ 1 ♀. We made frequent visits to three localities in the pine barrens, Medford Lakes, Taunton Lakes and Fisher's Dam, but the last named was the most interesting and profitable of the three. Each of the three is a series of lakes formed, I was told, by dams impounding the water in former bog lands or swamps. Medford Lakes, and Taunton Lakes to a much less degree, are surrounded by cottages and summer homes until little undisturbed shore line remains. At Medford Lakes only four species, *P. longipennis, E. vesperum, E. pictum* Morse and *I. verticalis,* were taken; at Taunton Lakes these four and fourteen others were collected, but all that were taken in numbers, except *E. pictum* of which 24 specimens were secured here, are common and widely distributed. Fisher's Dam included a variety of habitats, including lakes of deep, open water, shallow areas with varying densities of vegetation, flowing canals and bogs and the region was almost undisturbed except for occasional visits by workmen who keep the dams and canals in repair.

Specimens of *weewa* were taken only along a relatively open canal. They seemed to alight on the herbage along the stream

less frequently and to hover more closely to the water than is the habit of the closely allied species, *E. exsulans* Hagen, which is so familiar a species along Indiana streams. Altho quite numerous at the time of our visits the large number secured was the result of "specialized" and continued collecting. The specimen taken on August 1 was recognized as rather unusual in the field and as new to me when I had had an opportunity to study it more closely, and we returned on August 6 determined to secure further specimens. These were secured by wading the canal and exchanging nets frequently in order to have one dry enough to swing swiftly as the low flight of the species made it necessary to skim the surface of the water on almost every stroke. At this time the canal bed was covered with a layer of soft mud, four to eight inches deep, and a considerable amount of vegetation was growing in it; the water was eight to ten inches deep and the current was quite swift. However, before the time of our next visit, August 18, workmen had removed the vegetation and most of the soft mud from the canal bed. *E. weewa* was much less abundant than on the earlier dates, but this decrease may have been due to the approach of the end of its season as all of the specimens taken, even on the earlier dates, were violet-gray pruinose from age.

Other species collected along the canal on these dates were *Boyeria vinosa* Say, August 6, 4 ♂, teneral, *Agrion apicale* Burmeister, August 1, 11 ♂ 9 ♀, August 6, 18 ♂ 10 ♀, August 18, 4 ♂ 7 ♀, *A. maculatum*, August 1 and 6, 1 ♀, each date, and *A. violacea*, several on each of the three dates. Four other Enallagmas, *geminatum* Kellicott, *vesperum*, *pictum*, and *civile* Hagen were taken at Fisher's Dam but none of them was associated with *weewa*.

This species has been known previously only from Florida, Georgia and South Carolina. It is strange that any insect as abundant as we found *weewa* at this locality would escape notice in a region which has been studied so thoroly by entomologists, unless its occurrence is local or sporadic, or unless it has not been recognized as separate from a more common and

widely distributed species. It may be that specimens of *weewa* from this region exist in collections under the name of *exsulans*.

Since the above was written, Dr. Calvert has informed me that he has studied the specimens from Three States Point, Patcong Creek and Mullica Hill recorded in the *Insects of New Jersey* (Rept. N. J. State Museum for 1909, 1910) as *Enallagma exsulans*, and has found those from Patcong Creek to be *E. weewa*, those from the other two localities to be true *exsulans*. At the time of collection (1899) he had labeled the Patcong Creek specimens "E. exsulans old."

Dragonflies from High Altitudes in Colorado (Odonata).

By R. D. Bird and G. Olin Rulon, University of Oklahoma, Norman, Okla.

The following report is based on collections of Odonata made by Mr. Rulon during July and August, 1931, at elevations of 9000 to 12000 feet in the vicinity of Gothic, Colorado. Gothic, now the seat of the Rocky Mountain Biological Station, sponsored by the University of Oklahoma, is a ghost mining town situated a short distance from Crested Butte.

The first adult Odonata were noticed on July 21 at a small stagnant pool surrounded by sedge and grass. This pond is at an elevation of 9600 feet between Gothic and Avery Mountains, in the center of a small swamp about one mile and one-half northwest of the Station. It was filled with debris. Thick scum was on the surface of the water. Sphagnum was abundant. *Somatochlora semicircularis* 1 ♂, and *Coenagrion resolutum* 4 ♂, were taken.

The second collection was made on July 25 at Meridian Lake about three miles northwest of Crested Butte and west over Gothic Mountain from the Laboratory. The lake is at an elevation of 9000 feet, is one and one-half miles long, about one hundred and fifty yards wide, has no outlet, and is fed by drainage from the surrounding hills. It is about fifty feet deep but contains much moss and debris about the edge. Grass, aspen and spruce come close to the shore. A few *Aeschna*, probably *palmata*, were seen; and *Enallagma boreale* 9 ♂ 6 ♀, and *Enallagma clausum* 1 ♂ 1 ♀, were taken.

A series of seven old beaver dams two and one-half miles south of the Laboratory at 9100 feet were the scene of three collections. The land about the ponds was swampy and supported a thick growth of *Carex* with an occasional willow. Here Odonata were found in abundance. The following captures were made: July 28, *Aeschna palmata* 1 ♂, *Lestes disjunctus* 4 ♂, *Enallagma clausum* 1 ♂ 2 ♀; July 30, *Aeschna palmata* 3 ♂ 2 ♀; August 8, *Aeschna palmata* 11 ♂ 1 ♀, *Aeschna interrupta interna* 1 ♂, *Sympetrum vicinum* 1 ♂ 2 ♀ (tenerals).

One collection was made on July 29 at a small lake situated at a height of 12000 feet in Sylvanite Basin. This lake was shallow, had no outlet, several floating islands and was surrounded by a marshy margin supporting a growth of *Carex*. The pH of the water was 7.4. The following were collected: *Aeschna palmata* 1 ♂, *Somatochlora semicircularis* 16 ♂ 1 ♀, *Lestes disjunctus* 3 ♂, *Lestes uncatus* 1 ♂, *Coenagrion resolutum* 6 ♂ 1 ♀, *Enallagma boreale* 4 ♂.

A collection was made on August 4 at Lost Lake. This is a small deep lake about three miles northwest of the laboratory with very steep banks (approximately 60°). It was fed by drainage from Bellevue and Baldy Mountains but had no outlet. There was much debris of logs and sticks close to the edge; vegetation on the banks was *Carex*, and grass; elevation 11000 feet. Four male *Aeschna palmata* were taken.

In addition to the collections of Mr. Rulon, the senior author, while following the trail up Copper Creek to Corundum Pass on August 3, 1930, took *Somatochlora semicircularis* and *Enallagma boreale* at 10300 and 11000 feet respectively.

To summarize, the following nine species of Odonata were taken at Gothic, Colorado, from July 21 to August 4, 1931:

1. *Aeschna palmata* Hagen	9100 to 12000 feet
2. *Aeschna interrupta interna* Walker	9100 feet
3. *Somatochlora semicircularis* Selys	9600 to 12000 feet
4. *Sympetrum vicinum* Hagen	9100 feet
5. *Lestes disjunctus* Selys	9100 to 12000 feet
6. *Lestes uncatus* Kirby	12000 feet
7. *Coenagrion resolutum* Hagen	9600 to 12000 feet
8. *Enallagma boreale* Selys	9000 to 12000 feet
9. *Enallagma clausum* Morse	9000 to 9100 feet

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1933.

ENTOMOLOGY AT THE CONVOCATION WEEK MEETINGS, DECEMBER 27 TO 31, 1932.

Our annual summary of the entomological items of the programs of the American Association for the Advancement of Science and Associated Societies, held at Atlantic City, New Jersey, follows:

The numbers of papers bearing on insects, including those in symposia and non-duplicating demonstrations were:

Entomological Society of America	38
American Association of Economic Entomologists	130
American Society of Zoologists	18
American Society of Parasitologists	3
American Phytopathological Society	3
Ecological Society of America	3
Genetics Society of America	14
Phi Sigma Biological Research Society	1
American Society for Horticultural Science	1
Potato Association of America	1
Total	212

These papers were distributed in subject as follows:

i

*General Entomology	8
*Collecting and Rearing Methods	4
*Cytology	4
Anatomy	5
*Physiology	28
Ecology	6
Behavior	1
*Geographical Distribution	10
Variation	1
Genetics	14
*Taxonomy	7
*Parasites of Insects	12
*General Economic Entomology	17
*Insecticides	28
Apiculture	12
Insects Affecting Man	1
do. Cereals and Field Crops	13
* do. Truck Crops	10
* do. Ornamental & Greenhouse Plants	8
* do. Fruits & Fruit Trees	30
* do. Forest & Shade Trees	7
*Insects Carrying Plant Disease germs	3
Household Insects	3

ii

*Acarina	4
Araneina	1
Orthoptera	12
Plecoptera	1
Homoptera	10

*Heteroptera 4
*Thysanoptera 8
Coleoptera (excluding Japanese Beetle) 18
* Japanese Beetle 4
Hymenoptera (excl. Honey Bee) 14
Honey Bee 7
*Lepidoptera (excl. Codling Moth, Oriental Fruit Moth and Corn Borers) 21
* Codling Moth 11
* Oriental Fruit Moth... 6
* Corn Borers 5
*Diptera (excluding *Drosophila*) 22
* *Drosophila* 12

Many of these figures are duplications, both between sections i and ii and also within each section.

The total number of papers listed was 27 more than for the New Orleans meeting in 1931 and 32 more than for the Cleveland sessions of 1930. Increases in the numbers of papers for 1932 were shown in those subjects starred (*).

The Entomological Society of America met on December 27 and 28, in Haddon Hall Hotel, under the presidency of Prof. J. J. Davis, of Purdue University, Prof. H. B. Hungerford, of the University of Kansas, secretary. The annual symposium was on The Influence of Civilization on the Insect Fauna of North America, and the annual public address was by Dr. J. M. Swaine, on The Influence of Insect Life on Forest Development.

The American Association of Economic Entomologists met December 28 to 30, at the opposite end of a hall from the Entomological Society, making it easy to go from one to the other. Prof. W. P. Flint, of the University of Illinois, was president and Mr. A. I. Bourne, of Amherst, Massachusetts, secretary. There was a special discussion of The Problem of the Codling Moth and its Control.

The entomologists' dinner in th same hotel on December 29 at 6.15 P. M., was presided over by Prof. Flint who called on Mr. W. C. O'Kane to act as toastmaster. To take the minds of all present from troubles at home, he called, as speakers those who had recently been on entomological journeys, and interesting responses were made by Messrs. J. J. Davis (Europe and the Paris Congress), Kistliuk (West Indies and South America), Phillips (Russia), Claassen (China), Gardener (Japan), Swaine (Australia) and Bishopp (Texas).

Meetings of both societies are planned for Chicago in June and at Boston next December.

Samia cecropia Moth falls prey to Jumping Spider, Phidippus tripunctatus (Lepid.: Saturniidae; Araneae: Salticidae).

The giant silkworms appear to lead an extremely hazardous life with birds and various predaceous and parasitic forms taking heavy toll. The writer wishes to record an additional enemy which he recently observed in the act of attacking a Cecropia moth.

On June 6, 1932, a male Cecropia emerged from a cocoon which the writer had placed on a window sill between the window and window screen. The moth climbed up on the screen where its wings unfolded and dried. Several hours later a small, grassland jumping spider, *Phidippus tripunctatus*,[1] was observed stalking the moth, creeping up upon it, then scuttling away at any movement of the wings or antennae. After watching this performance at intervals for about two hours, the writer was rewarded by seeing the spider which was then about one inch away from the moth, leap upon the side of the moth. The moth fell off the screen and lay on its back on the window sill, moving its wings weakly in an attempt to get up. The spider was attached to the right side of the moth over the middle pair of legs and had its cephalothorax buried in the thick pubescence.

After fifteen minutes or so the spider was removed. Blood oozed out on the pubescence at the point of feeding. The moth was able to walk but the middle pair of legs and the right leg of the third pair were useless. The moth was able to move its wings but was unable to fly. The moth was caged and lived for ten days but did not recover the use of its legs and wings. Had the spider been permitted to continue feeding it would no doubt have killed the Cecropia in a short time in spite of the great disparity in size.

J. R. Stear, Koppers Research Corp., Ligonier, Penna.

The Effectiveness of the Sting of Aenoplex carpocapsae Cushman (Hymen.: Ichneumonidae).

In 1931 observations were made of the preservative property of the sting of the parasite *Aenoplex carpocapsae* Cushman upon the larvae of the codling moth, *Carpocapsae pomonella* Linne. The full grown spinning larvae were allowed to spin their cocoons in bits of corrugated paper and then were presented to *Aenoplex* for parasitization.

The female parasite mounts the corrugated paper and probes

[1] Identified by Prof. W. M. Barrows, Ohio State Univ., Columbus, Ohio.

it with her ovipositor until a vulnerable spot is found and then with a quick thrust she forces her ovipositor into the cocoon and stings the larva within, laying an egg at the point of stinging.

No matter how soon the cocoon is ripped open after the female has made her thrust and departed, the host is found immobile except for slight futile squirmings of the abdomen. The motor nerves have been paralyzed by the poison of the sting. The stung larva provides meat which remains fresh even after the parasite has fed for many hours and the supply has been nearly consumed.

The stung codling moth larvae were grouped in three categories according to their physical condition: *fresh,* when the color was creamy and pink and the body plump; *deteriorating,* when the skin was discoloring in places; and *dead,* when the larva was discolored thruout. These differences were noted, because the host larvae did not die at the end of a definite period following the sting, they died slowly and in parts as does a plant. Apparently as a result of the stinging the various cells of the body were slightly disassociated so that the death of one did not affect the condition of its neighbor for some time. Even when the tip of the abdomen is discoloring, the cells of the thorax may still remain alive.

The stung larvae remained *fresh* a maximum of 73 days, with an average of 26 days and a minimum of 41 hours. The period of *deterioration* averaged 12½ days, with a maximum of 26 days and a minimum of 42 hours. Thus from the time of the sting to death the preservative property of the female's sting extends over an average of 34¾ days with a maximum of 97 2/3 and a minimum of 5½ days.

These periods cover a great variety of conditions, including those in which the codling moth larva was stung, but not fed upon, and varying thru different stages of parasitization. In one instance the host was fed upon for 184 hours (7 2/3 days), and still remained fresh after the death of the parasite. Nature's methods of preservation are certainly efficient.

H. Elliott McClure, Urbana, Illinois.

Dragon-flies predacious on Tabanus spp. (Dipt.: Tabanidae)*.

The extensive coastal marsh areas of Louisiana, especially those west of the Mississippi River, are notorious for their enormous numbers of tabanids, mainly species of the genus

* From the Parasitology Laboratory, Department of Tropical Medicine, Tulane Medical School, New Orleans, Louisiana.

Tabanus. The writer, while motoring to or from Buras, Louisiana (60 miles south of New Orleans on the west bank of the Mississippi River) has frequently found the radiator of his car packed with scores (more than one hundred in certain instances) of *Tabanus* spp., chiefly the "greenheads." Fishing parties along the uninhabited bayous of the Gulf Coast complain bitterly of these pests. In many localities the source of blood meals of these flies must be cold-blooded vertebrates, since domestic animals are not present within a radius of many miles and man is an infrequent visitor. Muskrats probably furnish a fraction of the blood meals.

On May 4, 1932, a collecting trip to the mouth of Grand Bayou, Louisiana (Bay Bastian) revealed an abundance of *Tabanus* spp. Dragonflies were also especially abundant, particularly the "green jacket," *Mesothemis simplicicollis* Say. Investigation revealed the fact that the latter species was feeding extensively on *Tabanus conterminus* Walk. and *T. nigrovittatus* Macq.† These horse-flies are rather swift fliers but are quite unable to cope with the "green jacket." The tabanid being seized in the air by the dragon-fly (between its legs) the latter landed on a blade of marsh grass or twig, maintained its balance with the last two pairs of legs and used at least one of the prothoracic legs to manipulate its prey. Commencing with the head the dragon-fly ingested the entire *Tabanus*, including all appendages—the whole process requiring not more than 3-4 minutes. The dragon-flies were so intent on the feeding that they could be captured by hand. In one instance a dragon-fly was picked up and its prey escaped, but being injured, was placed in front of the predator which readily seized it and continued its meal in spite of the observer holding it by the wings.

Other species of dragon-flies were not observed feeding on the horse-flies but probably do so on occasion.

The writer is aware of no other observations of adult Odonata feeding on tabanids.‡ The fact that they can capture and ingest species of this size (body length=1.5 cms.) seems quite remarkable and in regions where they become abundant must play an important rôle in the control of these pests.

E. HAROLD HINMAN.

† The writer is indebted to Dr. J. G. Needham, Cornell University, for the identification of the dragon-flies and to Dr. Alan Stone, United States National Museum, for the identification of the horse-flies.

[‡ The late Mr. Herbert Campion, in his two papers on "Some Dragonflies and Their Prey," has recorded instances of adult Odonata feeding upon tabanids in Africa. Ann. & Mag. Nat. Hist. (8) xiii, p. 500, 1914, and (9) viii, p. 243, 1921.—EDITOR.]

Disturbances in the domestic tranquility of Chalybion caeruleum (Hymen.: Sphecidae).

A single cell of *Chalybion caeruleum* built on the inside of the writer's car permitted the observation of some unusual habits of this species. The car had been out of the garage for several hours each day and no doubt the wasp, on account of these interruptions, had some difficulty in finding its nest. The mud cell was first noticed on June 26 at 1 P. M., when it was about completed but not provisioned or sealed. During the remainder of June 26, the car was out of the garage and was not returned until 7 A. M. on June 27. From this time until the afternoon of June 29, the car was in the garage and little attention was paid to the nest. As a matter of fact it was quite forgotten by man but not by wasp, for, on the afternoon of June 29 the car was taken out again and it was noticed that the cell had been provisioned and sealed. The following morning it was discovered that a second cell had been started. The car was backed about ten feet out of the garage but the wasp failed to locate its nest. At 11 A. M. the car was shifted to the right side of the two car garage rather than the left, the original position. By 1 P. M. the nest was completed but not sealed. On July 1 no additional change was evident and apparently the nest was left open to be provisioned. An extended auto trip interrupted the observations for the car was out of the garage from July 2 to July 5. It was supposed that the wasp had surely abandoned the nest but the writer was surprised on July 9 to find that the second cell, upon which work had of necessity ceased on July 2, had been provisioned and sealed.

A few years ago the writer observed a species of *Chalybion* in Panama building a nest on the outside of a screen. While the wasp was away gathering a load of mud, a match was forced through the screen and across the opening of the cell which at this time was nearly finished. On its return, the wasp added a little mud to the edge of the nest and seemed much disturbed by the obstruction. She returned three times and worked a little mud on the edge of the cell but could not continue her building. After the third time she did not return and the nest was never finished.

Apparently the mud-dauber can withstand considerable inconvenience in nest building and can locate her nest even when it is moved several feet from its original location but cannot compete with impossible building conditions.

S. W. Frost, The Pennsylvania State College.

Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The **figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞ *Note the change in the method of citing the bibliographical references, as* **explained above.**

Papers published in the Entomological News are not listed.

GENERAL.—Bodenheimer, F. S.—Principle of population movements among insects. [37] 8: 18-20. **Coldewey, H.**—Twee jaren vlindervangst met electrisch licht. [101] 75: 182-187. **Goffe, E. R.**—Nomenclatorial opinions of the 5th Entomological Congress, Paris, July 1932. [Jour. Ent. Soc. So. England] 1: 47-50. **Jacot, A. P.**—Evaluation of the forest flora population. [4] 64: 265-267. **Lindinger, L.**—Strenge winter und die insektenwelt. [17] 49: 237-238. **Matteson, J. H.**—Une lettre du V Congres International d'Entomologie, Paris, France, 16 Au 23 Juillet 1932. [39] 16: 40-45. **Muir, F. A. G.**—Biographical sketch. The work of Dr. Frederick A. G. Muir in the biological control of sugar cane insects in Hawaii. [37] 8: 141-152. **Needham, J. G.**—The Thomas Say Foundation gets under way. [68] 76: 567-568. **Oudemans, J. T.**—Obituary. [101] 75: i-xvi, ill. **Plummer & Landis.**—Records of some insects predacious on Epilachna corrupta in Mexico. [7] 25: 695-708, ill. **Robertson, C.**—About nomenclature. [90] 67: 53-61. **Rodeck, H. G.**—Arthropod designs on prehistoric Mimbres pottery. [7] 25: 688-693, ill. **Ross, H.**—Praktikum der Gallenkunde (Cecidologie). [Biol. Studienb., Berlin] 12: 312 pp., ill. **Turner, J. T.**—Races. [21] 44: 149-150.

ANATOMY, PHYSIOLOGY, ETC.—Aubertot, M.—Origine proventriculaire et évacuation continue de la membrane péritrophique chez les larves d'Eristalis tenax. Les sacs péritrophiques des larves d'Aeschna (Odonates

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